Development of the Arizona Statewide Consortium of Cardiac Arrest Centers



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Objective

AHA guidelines call for therapeutic hypothermia (TH) in patients who have return of spontaneous circulation (ROSC) but remain comatose after out-of-hospital cardiac arrest (OHCA) from ventricular fibrillation. In addition, early percutaneous intervention (PCI) and other post-arrest care may improve outcomes. To the best of our knowledge, no state agency has yet implemented a system to assure that eligible OHCA patients are receiving standardized, guideline based post cardiac arrest care.

Our objective is the implementation of a statewide system of designated specialty Cardiac Arrest Centers (CACs), along with a prehospital protocol directing eligible patients to CACs, to increase the delivery of guideline-based therapies. Furthermore, this system will serve as a framework for tracking ST-elevation myocardial infarction (STEMI) patients to determine outcome for this specific subgroup of OHCA patients.

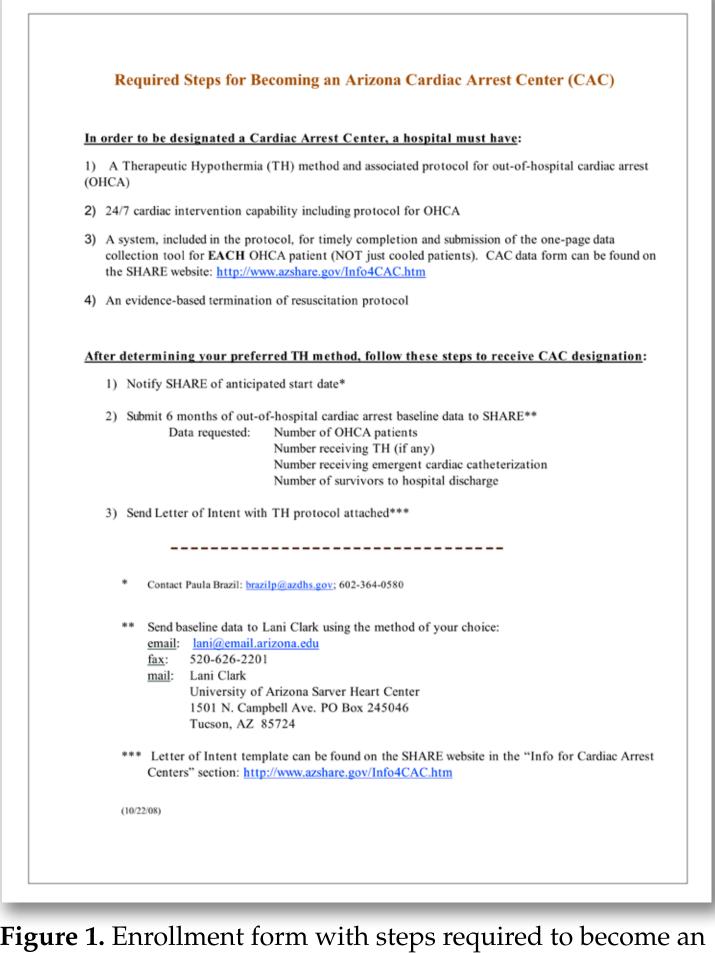
Methods

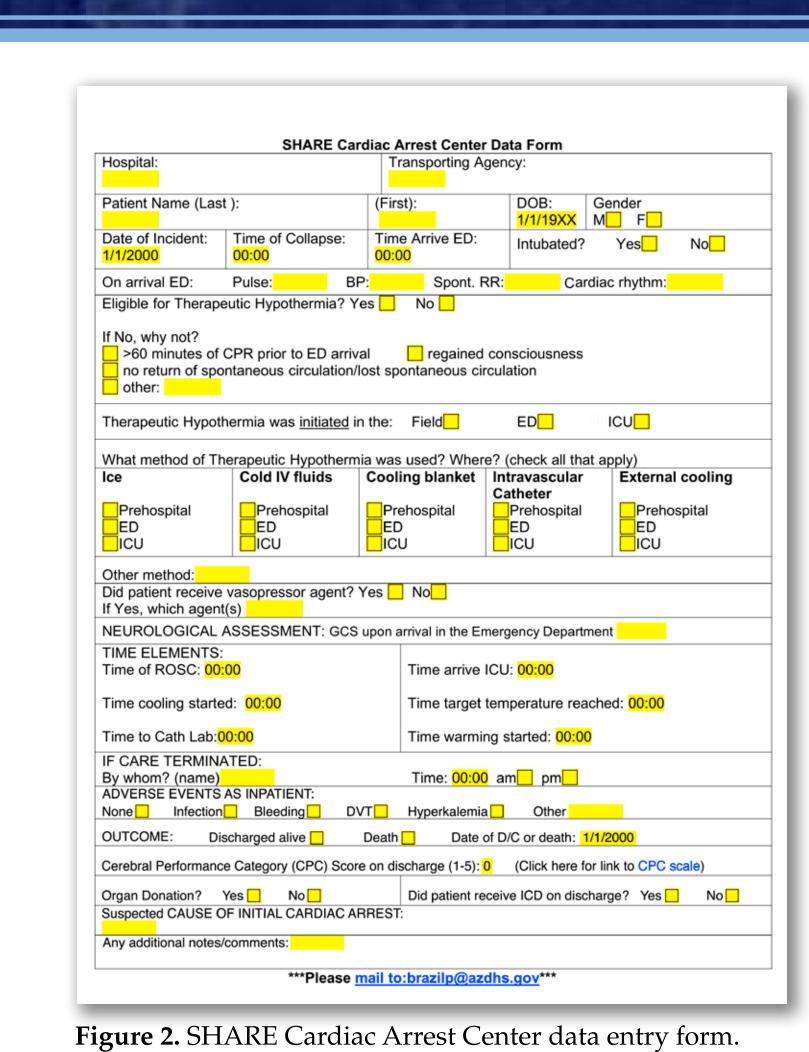
In December, 2007, the Arizona Department of Health Services (ADHS) initiated a program of designating hospitals as CACs based upon ability to 1) administer TH, 2) perform

24/7 PCI, 3) report accurate data 4) utilize an evidencebased termination of resuscitation protocol (Figure 1).

The Cardiac Arrest Center Program was initiated with key stakeholders (hospital Critical Care Medicine, Emergency Medicine, Cardiology nursing and physician leaders, hospital administrators and prehospital providers) in Arizona. A website (www.azshare.gov) was utilized to relay

Figure 1. Enrollment form with steps required to become an Arizona Cardiac Arrest Center (CAC).





program concepts along with detailed protocol information to interested hospitals. Those hospitals meeting the above criteria and showing interest were given targeted live presentations. ADHS staff were available to help review hospital protocols and answer questions regarding the program goals and implementation.

Hospitals were required to provide 6 months baseline OHCA data along with a letter of intent from their administration agreeing to participate and

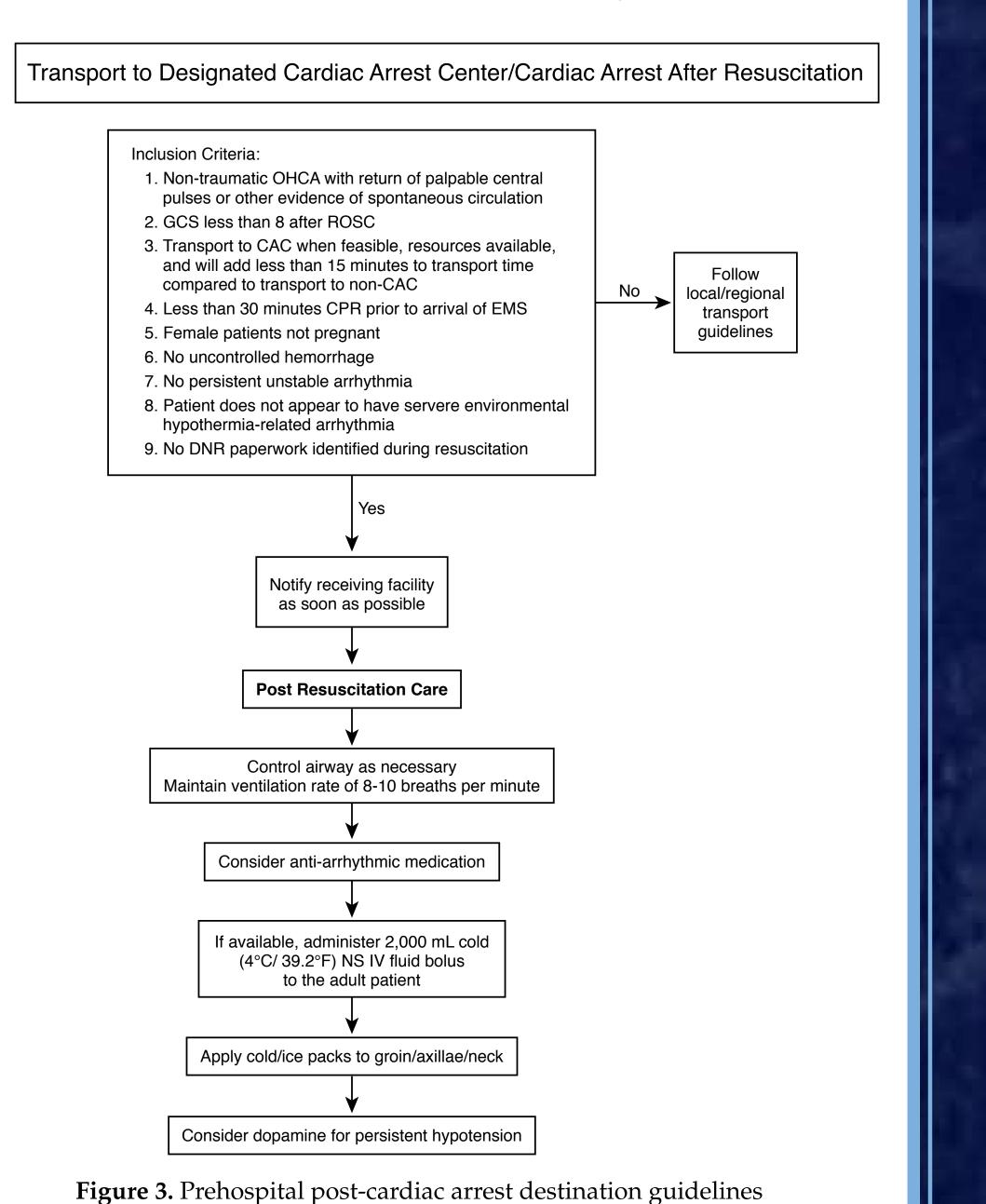
continue to submit data to a HIPAA exempt secure database utilized for system-wide OHCA quality improvement (Figure 2).

In addition, the State EMS Council approved a prehospital protocol. This established criteria allowing EMS personnel to bypass local

hospitals to take comatose, ROSC patients to CACs, as long as the estimated increase in transport interval was no greater than 15 minutes (Figure 3). Here we report the preliminary process outcomes from the first ten months of the program.

Results

Prior to initiating the consortium, only 1 of 61 acute care hospitals in Arizona routinely administered TH for comatose ROSC patients. In the first 10 months of program implementation (12/07-5/08), a prehospital



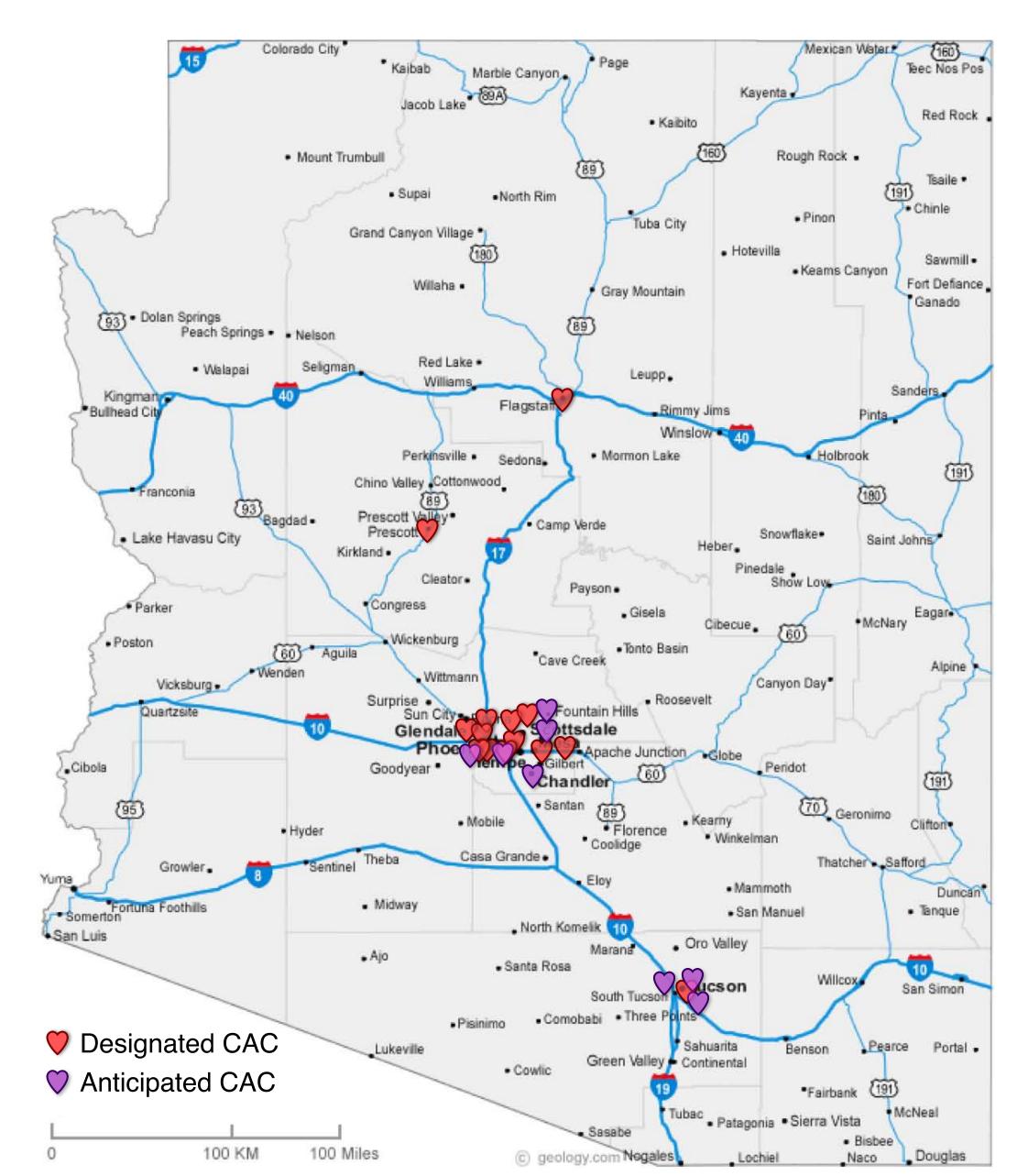
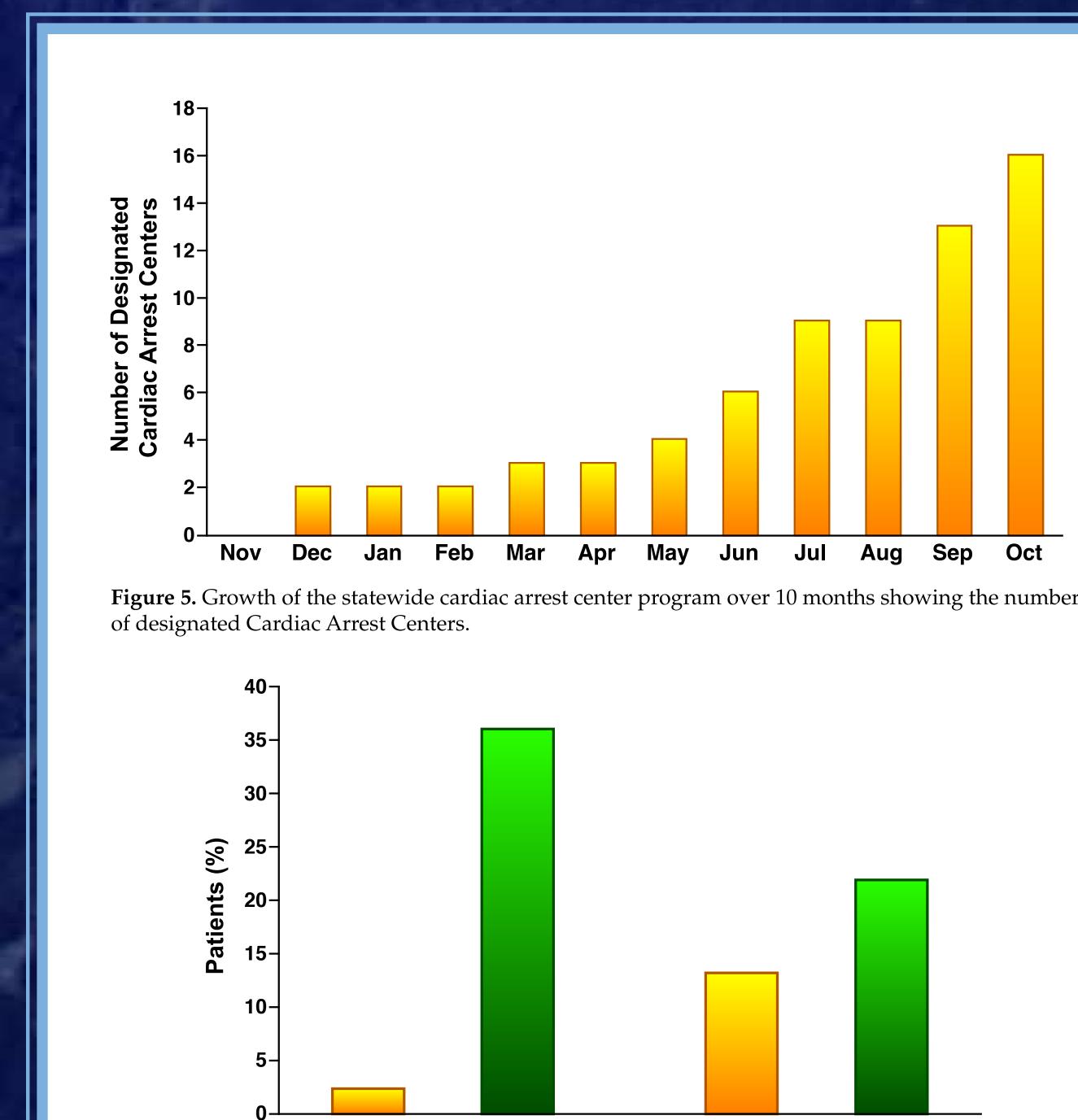


Figure 4. Designated Cardiac Arrest Centers and those anticipated in the near future.

diversion protocol was approved (Figure 3) and 16 hospitals met criteria and were designated as CACs (Figure 4). Currently, 49.1% of the 6,166,318 residents of Arizona are served by a CAC and an additional 14.0% are served by hospitals targeted to become CACs by 12/08 (Figure 5). Since implementation, a total of 29 patients have received TH at 10 CACs. Use of TH has increased from 2.3% in the baseline period to 34.1% in the post-designation period. Furthermore, overall OHCA (all rhythms) survival to discharge has increased from 13.1% to 22.4% (a 69.7% increase) following Cardiac Arrest Center designation (Figure 6). The TH utilization is significant P < 0.0001 and the survival is significant to P < 0.05 (P = 0.0410). Both were by Fisher's exact test and Chi-square. Between 10/17/04 and 4/1/08 there were 3,217 adult presumed cardiac OHCAs statewide, of which 636 (19.7%) had ROSC but remained comatose. Thus, we estimate that nearly 200 patients per year may have the potential to benefit from this program. Etiology of arrest (STEMI, etc.), survival and neurological outcome data are currently being collected.



Conclusion

Figure 6. Therapeutic Hypothermia and survival: Pre and post implementation.

Survival to Discharge

It is feasible for a state EMS Lead Agency to implement a statewide specialty hospital designation program and establish a prehospital bypass protocol directing appropriate patients to these centers. Our analysis demonstrates that the number of patients who may benefit from this system enhancement is significant. In Arizona, early results show an increased utilization of TH and increased survival to discharge. Data from this program will also provide insight into issues regarding the optimal timing, method, interactions with other therapies, and duration of cooling post cardiac arrest patients. Our preliminary experience suggests that this approach may serve as a model for other states and large healthcare systems.